CLAIMS

1. A method for generating a work flow schedule, the schedule including a plurality of tasks, each task requiring at least one resource, each resource having a limitation and a cost, the method comprising:

creating, using a makespan minimizer, an initial schedule of tasks, the schedule not violative of the resource limits and task constraints associated with the tasks in the schedule; and

lowering the limitations of each resource and using the makespan minimizer to find a new valid schedule for the new level of resources.

2. The method of claim 1, wherein each resource limitation includes an upper bound for an associated resource, and the step of lowering the limitations of each resource further comprises:

lowering the resource to a level where, while the remaining resources are at their upper bounds, the makespan minimizer is not able to return a valid schedule; and

incrementing the lowered resource level until the makespan minimizer is able to return a valid schedule.

3. The method of claim 2, further comprising:

selecting a resource and lowering its level from its original level by a constant amount;

determining whether the makespan minimizer can return a valid schedule using the lowered value of the resource; and

responsive to the makespan minimizer not returning a valid schedule using the lowered value of the resource, returning the resource to its original level.

4. A method for generating a work flow schedule, the schedule including a plurality of tasks, each task requiring at least one resource, each resource having a limitation and a cost, the method comprising:

incrementally generating an initial schedule by calling, for each task, a manpower planner to determine an at least partially optimized time for the task to be executed, such that the execution of the task at the optimized time results in the lowest total cost for the incremental schedule; and

incrementally improving the initial schedule by calling, for each task, the manpower planner, and determining a new at least partially optimized time to execute the task, such that the execution of the task at the new optimized time minimizes the total cost of the improved schedule.

5. A method for determining an optimal resource acquisition and release profile for a given schedule, comprising:

receiving a schedule specifying resource requirements at a plurality of time points, each resource having at least one associated cost;

for each resource required by the schedule:

for each time point, using a dynamic programming procedure to determine an optimal cumulative cost from the beginning of the schedule to the time point, for a plurality of resource levels;

determining the optimal cost of the schedule by selecting, from the group of optimal cumulative costs from the beginning of the schedule to a last time point, the optimal cumulative cost having the lowest cost; and

determining based on the optimal cost of the schedule, an optimal resource acquisition and release profile.

6. A system for generating a work flow schedule, the schedule including a plurality of tasks, each task requiring at least one resource, each resource having a limitation and a cost, the system comprising:

a makespan-based load leveler, for minimizing schedule makespan subject to resource limits, lowering the resource limits, and repeating the makespan minimization in order to create a flatter schedule.

7. The system of claim 6, further comprising:

a manpower planner, communicatively coupled to the cost minimizer, for determining based on task and resource information, including valid task start times and resource costs, a plurality of optimal resource levels for a schedule.

8. A system for generating a work flow schedule, the schedule including a plurality of tasks, each task requiring at least one resource, each resource having a limitation and a cost, the system comprising:

a cost minimizer for generating an initial valid work flow schedule according to which each task is executed without exceeding any limitations of any of the resources required by the task, and incrementally improving the schedule such that the total cost of the schedule is reduced with each incremental improvement; and

a manpower planner, communicatively coupled to the cost minimizer, for determining based on task and resource information, including valid task start times and resource costs, a plurality of optimal resource levels for a schedule.

9. A system for generating a work flow schedule, the schedule including a plurality of tasks, each task requiring at least one resource, each resource having a limitation and a cost, the system comprising:

first incrementing means for incrementally generating an initial schedule by calling, for each task, a manpower planner to determine an optimal time for the task to be executed, such that the execution of the task at the optimal time results in the lowest total cost for the incremental schedule; and

second incrementing means, communicatively coupled to the first incrementing means, for incrementally improving the initial schedule by calling, for each task, the manpower planner, and determining a new optimal time to execute the task, such that the new optimal time is the time that minimizes the total cost of the improved schedule.

10. A system for generating a work flow schedule, the schedule including a plurality of tasks, each task requiring at least one resource, each resource having a limitation and a cost, the system comprising:

creating means for creating, using a makespan minimizer, an initial schedule of tasks, the schedule not violative of the resource limits and task constraints associated with the tasks in the schedule; and

lowering means, coupled to the creating means, for lowering the limitations of each resource and using the makespan minimizer to find a new valid schedule for the new level of resources.